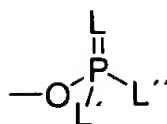


A is either a phosphorylating moiety



where

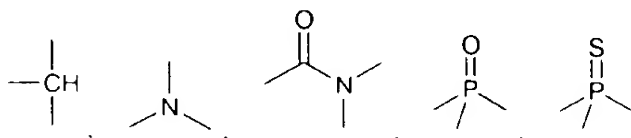
L is O, S, or not present

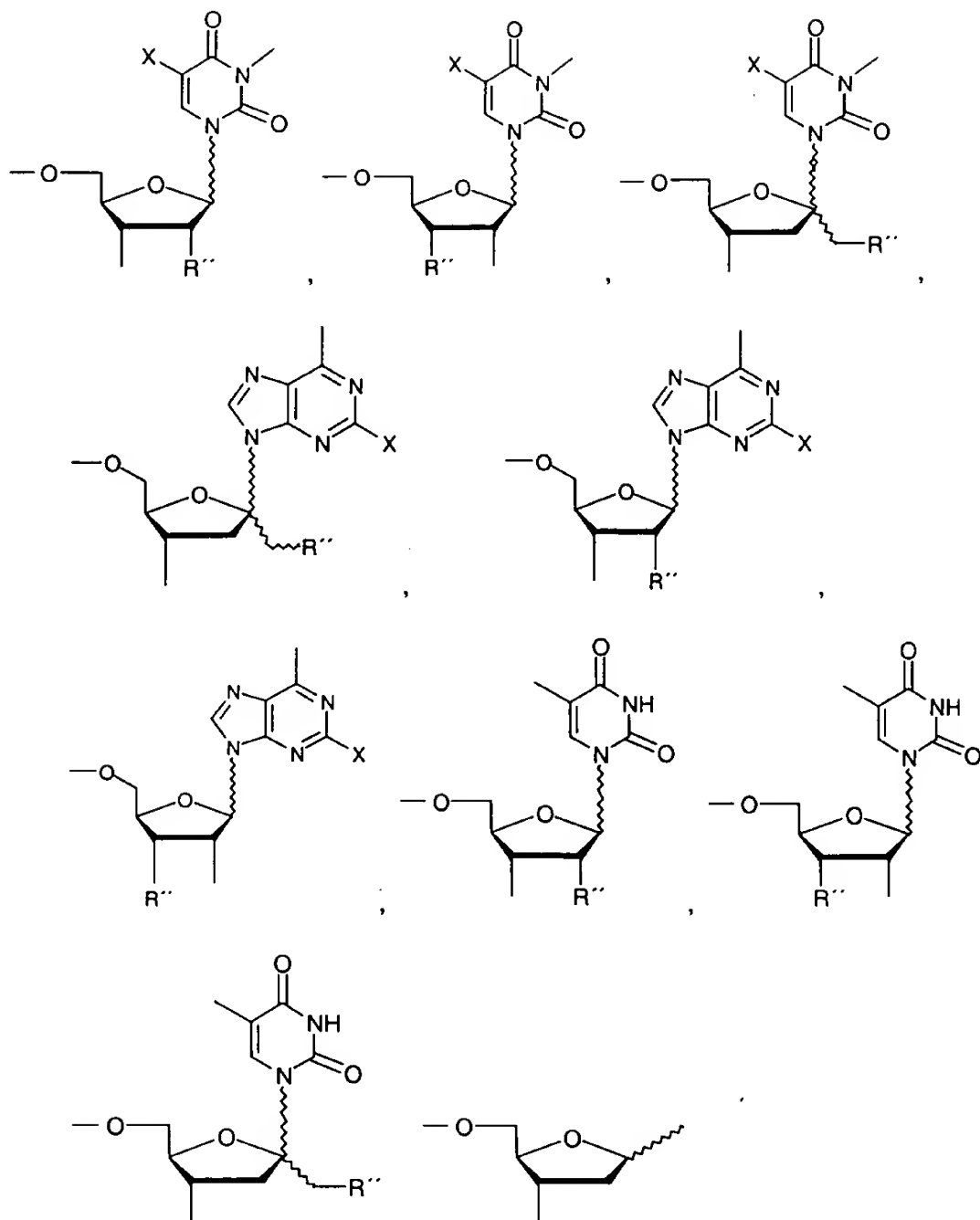
L' is H, L'''CH<sub>2</sub>CH<sub>2</sub>CN or L'''Ar, where Ar is phenyl or its substituted derivative, where the substituent is nitro or chlorine, and L''' is O or S;

L'' is O<sup>-</sup>, S<sup>-</sup>, Cl, N(i-Pr)<sub>2</sub>; or

*1*  
*B*  
*contd*  
A is a solid support tethered to Z via a linker arm, which is formed of one to ten moieties, each moiety being selected from a group consisting of phenylene, alkylene containing 1-12 carbon atoms, ethynediyl (-C≡C-), ether (-O-), thioether (-S-), amide (-CO-NH-, -NH-CO-, -CO-NR'- and -NR'-CO-), carbonyl (-CO-), ester (-COO- and -OOC-), disulfide (-S-S-), diaza (-N=N-), and tertiary amine (-N-R'), wherein R' represents an alkyl containing less than 5 carbon atoms;

Z is a bridge point and is formed from





or trivalent derivatives, substituted or unsubstituted, of cyclohexane, cyclohexene, cyclohexadiene, phenyl, cyclopentane, cyclopentene, cyclopentadiene, cyclobutane, cyclobutene,

cyclobutadiene, aziridine, diaziridine, oxetane, thietaneazete, azetidene, 1,2-dihydro-1,2-diazete, 1,2-diazetidene, furan, tetrahydrofuran, thiophene, 2,5-dihydrothiophene, thiolane, selenophene, pyrrole, pyrrolidine, phosphole, 1,3-dioxolane, 1,2-dithiole, 1,2-thiolane, 1,3-dithiole, 1,3-dithiolane, oxazole, 4,5-dihydrooxazole, isoxazole, 4,5-dihydroisoxazole, 2,3-dihydroisoxazole, thiazole, isothiazole, imidazole, imidazolidine, pyrazole, 4,5-dihydropyrazole, pyrazolidine, triazole, pyran, pyran-2-one, 3,4-dihydro-2H-pyran, tetrahydropyran, 4H-pyran, pyran-4-one, pyridine, pyridone, piperidine, phosphabenzene, 1,4-dioxin, 1,4-dithiin, 1,4-oxathiin, oxazine, 1,3-oxazinone, morpholine, 1,3-dioxane, 1,3-dithiane, pyridazine, pyrimidine, pyrazine, piperazine, 1,2,4-triazine, 1,3,5-triazine, 1,3,5-triazacyclohexane-2,4,6-trione; where

*B  
cont'd*

$R''$  is H or  $X'X''$ , where

$X'$  is -O-, -S-, -N-, ON- or -NH- and  $X''$  is a permanent protection group such as t-butyltrimethylsilyl-, tetrahydropyranyl, 1-(2-fluorophenyl)-4-methoxypiperidin-4-yl-, 1-[2-chloro-4-methylphenyl]-4-methoxypiperidin-4-yl-, 4-methoxytetrahydropyran-4-yl-, phthaloyl-, acetyl, pivaloyl-, benzoyl-, 4-methylbenzoyl, benzyl-, trityl or

X' is -O- and X'' is alkyl or alkoxyalkylalkyl;

X is H, alkyl, alkynyl, allyl, Cl, Br, I, F, S, O, NHCOCH(CH<sub>3</sub>)<sub>2</sub>, NHCOCH<sub>3</sub>, NHCOPh, SPh<sub>3</sub>, OCOCH<sub>3</sub> or OCOPh;

E is a linker arm between R and Z, and is formed of one to ten moieties, each moiety being selected from a group consisting of phenylene, alkylene containing 1-12 carbon atoms, ethynediyl (-C≡C-), ether (-O-), thioether (-S-), amide (-CO-NH-, -NH-CO-, -CO-NR'- and -NR'-CO-), carbonyl (-CO-), ester (-COO- and -OOC-), disulfide (-S-S-), diaza (-N=N-), and tertiary amine (-N-R'), wherein R' represents an alkyl containing less than 5 carbon atoms, or not present;

*B<sup>1</sup>  
contd*

E' is a linker arm between G and Z, and is formed of one to ten moieties, each moiety being selected from a group consisting of phenylene, alkylene containing 1-12 carbon atoms, ethynediyl (-C≡C-), ether (-O-), thioether (-S-), amide (-CO-NH-, -NH-CO-, -CO-NR'- and -NR'-CO-), carbonyl (-CO-), ester (-COO- and -OOC-), disulfide (-S-S-), diaza (-N=N-), and tertiary amine (-N-R'), wherein R' represents an alkyl containing less than 5 carbon atoms, or not present;

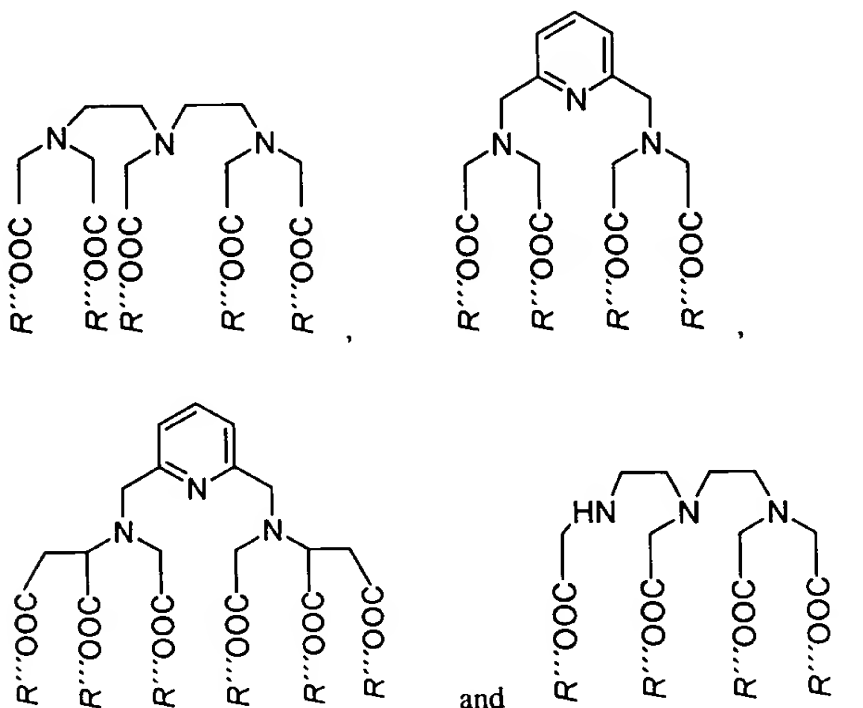
G is a bivalent aromatic structure, tethered to two iminodiacetic acid ester groups N(CH<sub>2</sub>COOR''')<sub>2</sub> where

R''' is an alkyl of 1 to 4 carbon atoms, allyl, ethyltrimethylsilyl, phenyl or benzyl, which phenyl or benzyl can be substituted or unsubstituted, and

said bivalent aromatic structure is capable of absorbing light or energy and transferring the excitation

energy to a lanthanide ion after the solid phase synthesis made labeling reactant has been released from the used solid support, deprotected and converted to a lanthanide chelate, or

G is a structure selected from a group consisting of

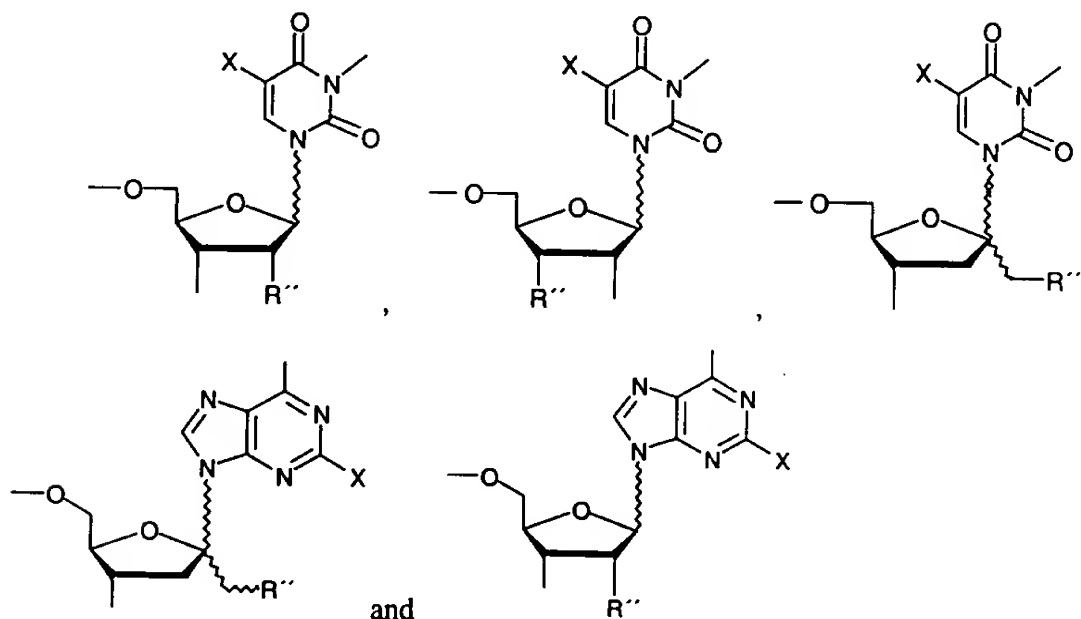


R''' is an alkyl of 1 to 4 carbon atoms, allyl, ethyltrimethylsilyl, phenyl or benzyl, which phenyl or benzyl can be substituted or unsubstituted, and

one of the hydrogen atoms is substituted with E', or

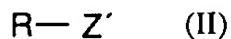
G is a protected functional group, where the functional group is amino, aminooxy, carboxyl, thiol,

and the protecting group is phthaloyl, trityl, 2-(4-nitrophenylsulfonyl)ethoxycarbonyl, fluorenylmethyloxycarbonyl, benzyloxycarbonyl or *t*-butoxycarbonyl for amino and aminooxy, alkyl for carbonyl and alkyl or trityl for thiol provided that bridge point **Z** is selected from a group consisting of



- B<sup>2</sup>*
13. (Once Amended) A method for direct attachment of a conjugate group to an oligonucleotide structure enabling the attachment of a desired number of these groups during chain assembly

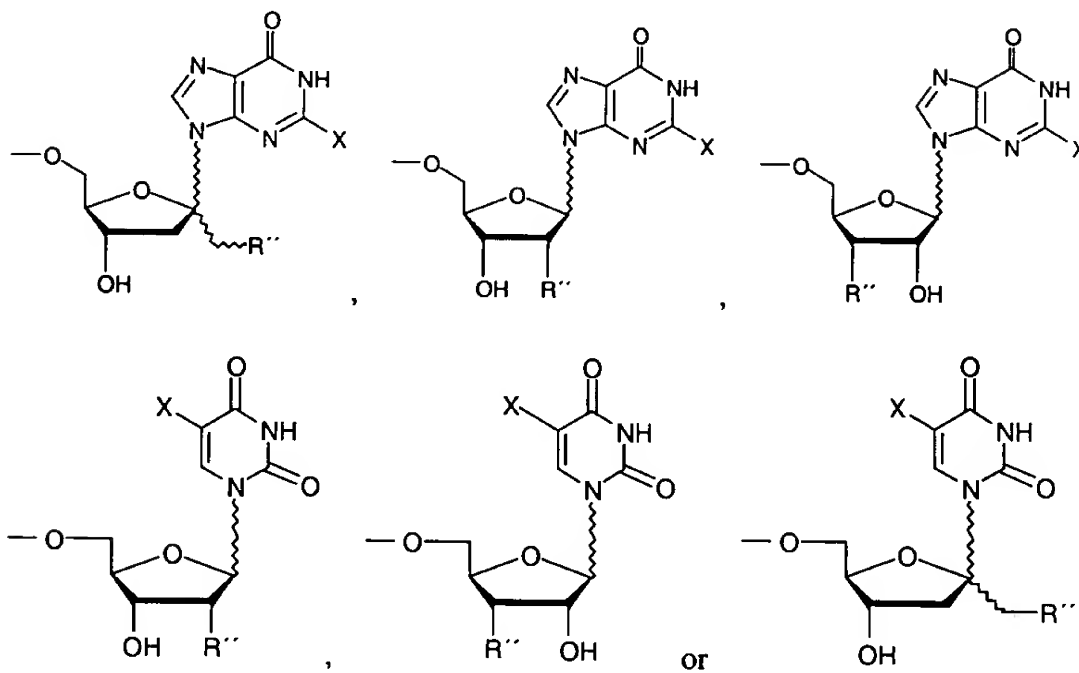
characterized in that it comprises a Mitsunobu alkylation of a compound of formula (II)



wherein

R is a temporary protecting group such as DMTr, MMTr, Tr or pixyl;

Z' is an acidic bridge point selected from a group consisting of



R' is H or X'X'', where X' is -O-, -S-, -N-, ON- or -NH- and X'' is a permanent protection group such as *t*-butyldimethylsilyl-, tetrahydropyranyl, 1-(2-fluorophenyl)-4-

methoxypiperidin-4-yl-, 1-[2-chloro-4-methyl)phenyl]-4-metoxypiperidin-4-yl-, 4-methoxytetrahydropyran-4-yl-, phthaloyl-, acetyl, pivaloyl-, benzoyl-, 4-methylbenzoyl, benzyl-, trityl or alkyl;

X is H, alkyl, alkynyl, allyl, Cl, Br, I, F, S, O,  $\text{NHCOCH}(\text{CH}_3)_2$ ,  $\text{NHCOCH}_3$ ,  $\text{NHCOPh}$ ,  $\text{SPh}_3$ ,  $\text{OCOCH}_3$  or  $\text{OCOPh}$ ;

and  $\text{pK}_a$  of said acidic bridge point is  $<14$ ;

with a compound of formula(III)



wherein

$\text{E}''$  is an arm with a primary aliphatic OH group at the end, which arm is formed of one to ten moieties, each moiety being selected from a group consisting of phenylene, alkylene containing 1-12 carbon atoms, ethynediyl ( $-\text{C}\equiv\text{C}-$ ), ether ( $-\text{O}-$ ), thioether ( $-\text{S}-$ ), amide ( $-\text{CO}-\text{NH}-$ ,  $-\text{NH}-\text{CO}-$ ,  $-\text{CO}-\text{NR}'$ - and  $-\text{NR}'-\text{CO}-$ ), carbonyl ( $-\text{CO}-$ ), ester ( $-\text{COO}-$  and  $-\text{OOC}-$ ), disulfide ( $-\text{S}-\text{S}-$ ), diaza ( $-\text{N}=\text{N}-$ ), and tertiary amine ( $-\text{N}-\text{R}'$ ), wherein  $\text{R}'$  represents an alkyl containing less than 5 carbon atoms;

G is a bivalent aromatic structure, tethered to two iminodiacetic acid ester groups  $\text{N}(\text{CH}_2\text{COOR}''')_2$

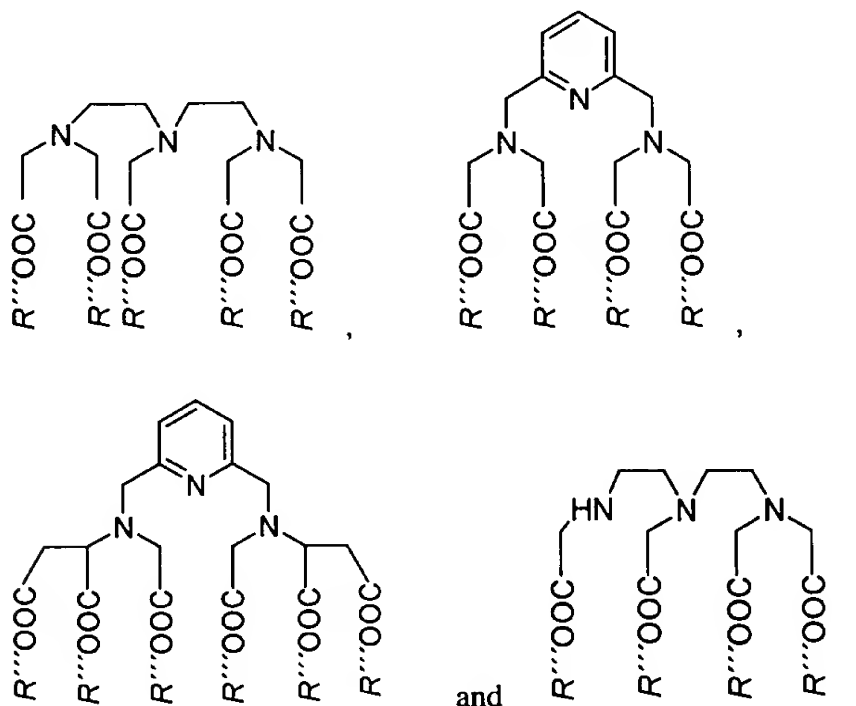
where

$\text{R}'''$  is an alkyl of 1 to 4 carbon atoms, allyl, ethyltrimethylsilyl, phenyl or benzyl, which



phenyl or benzyl can be substituted or unsubstituted and  
said bivalent aromatic structure is capable of absorbing light or energy and transferring the excitation  
energy to a lanthanide ion after the solid phase synthesis made labeling reactant has been released  
from the used solid support, deprotected and converted to a lanthanide chelate, or

G is a structure selected from a group consisting of



where

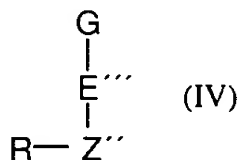
R''' is an alkyl of 1 to 4 carbon atoms, allyl, ethyltrimethylsilyl, phenyl or benzyl, which  
phenyl or benzyl can be substituted or unsubstituted, and  
one of the hydrogen atoms is substituted with E', or

G is a protected functional group, where the functional group is amino, aminooxy, carboxyl, thiol, and the protecting group is phthaloyl, trityl, 2-(4-nitrophenylsulfonyl)ethoxycarbonyl, fluorenylmethyloxycarbonyl, benzyloxycarbonyl or *t*-butoxycarbonyl for amino and aminooxy, alkyl for carbonyl and alkyl or trityl for thiol, or

G is not present; and

the functional groups of E' and G, excluding said primary aliphatic OH group, are protected;

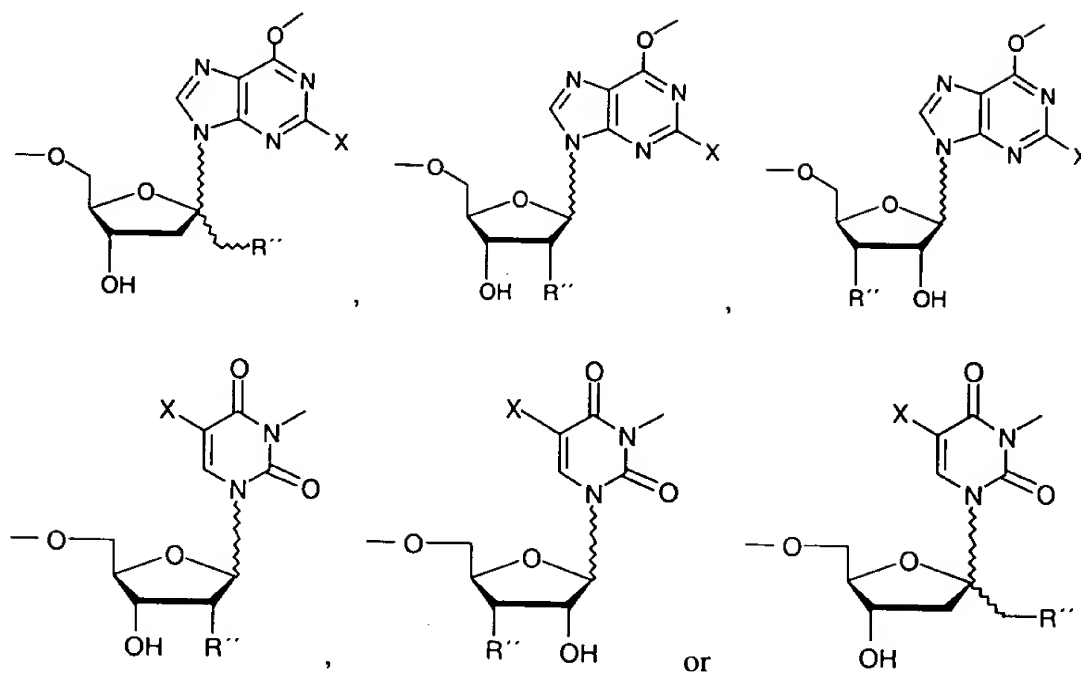
to produce compound of formula (IV)



wherein G and R of compound (IV) are as defined above;

E''' is a linker arm between G and Z, and is formed of one to ten moieties, each moiety being selected from a group consisting of phenylene, alkylene containing 1-12 carbon atoms, ethynediyl (-C≡C-), ether (-O-), thioether (-S-), amide (-CO-NH-, -NH-CO-, -CO-NR'- and -NR'-CO-), carbonyl (-CO-), ester (-COO- and -OOC-), disulfide (-S-S-), diaza (-N=N-), and tertiary amine (-N-R'), wherein R' represents an alkyl containing less than 5 carbon atoms; and

$Z''$  is a bridge point selected from a group consisting of



where

$R''$  is H or  $X'X''$ , where  $X'$  is -O-, -S-, -N-, ON- or -NH- and  $X''$  is a permanent protection group such as *t*-butyldimethylsilyl-, tetrahydropyranyl, 1-(2-fluorophenyl)-4-methoxypiperidin-4-yl-, 1-[2-chloro-4-methylphenyl]-4-methoxypiperidin-4-yl-, 4-methoxytetrahydropyran-4-yl-, phthaloyl-, acetyl-, pivaloyl-, benzoyl-, 4-methylbenzoyl-, benzyl-, trityl or alkyl;

$X$  is H, alkyl, alkynyl, allyl, Cl, Br, I, F, S, O,  $\text{NHCOCH}(\text{CH}_3)_2$ ,  $\text{NHCOCH}_3$ ,  $\text{NHCOPh}$ ,  $\text{SPh}_3$ ,  $\text{OCOCH}_3$  or  $\text{OCOPh}$ .